

Remarks

Claims 1 to 20 are pending.

Claims 15 and 16 have been amended and new claims 17 to 20 are submitted for consideration by the Examiners. Support for these amendments can be found in Fig. 5 and at paragraphs [0028], [0039] and [0042] as filed. Claim 3 has also been amended to improve form.

Paragraph [0039] has been amended to correct the erroneous reference to Fig. 6, and to expressly state that the example wire shown in Fig. 5 has a substantially circular cross-sectional shape. Support for this amendment can be found in Fig. 5 as filed.

The Examiner has rejected former claims 1 to 14 under 35 U.S.C. §103(a) as obvious having regard to US 5,869,178 to Kusy et al. (“Kusy”) in view of US 5,904,803 to Hillerich III et al. (“Hillerich”). The Applicant respectfully traverses this rejection.

Specifically, in order to reject the claims under 35 USC 103, as obvious, in view of the references the Examiner must establish that: a) all of the claimed limitations are found in the references; b) there is a motivation to modify or combine the references to arrive at the claimed invention; and c) there is a likelihood of success.

Careful review of Kusy reveals that Kusy discloses pultruded fiber-reinforced plastic and related apparatus and method. In Kusy, the plastic is made with a pultrusion apparatus preferably vertically disposed. Fibers are fed into the apparatus, spread and wetted with resin in a bundle spreader, formed in a forming die 50, and then cured in a curing chamber 53 of the forming die 50. Kusy does not disclose a shrinkable die, as acknowledged by the Examiner.

Hillerich discloses a mold for use in baseball bat manufacturing, a non-analogous art to pultrusion fabrication of composite plastic or orthodontic wire. A careful review of Hillerich reveals that the mold of Hillerich is formed by placing a high shrink tubing 82 over a hollow tube 74 and a bat assembly 32. Tubing 82 is heat shrunk down into close fitting contact with tube 74 and assembly 32. When the tubing 82 is shrunken to the mold 72, no resin is placed within the tubing. The hollow tube 74 is then removed leaving the bat assembly 32 encased in a

plastic heat shrunken skin which forms a plastic tubular mold 72. After the tube 74 has been removed, epoxy resin components are poured into the tubular mold 72 and pressured by high pressure air to wet-out fiberglass sleeve layers in the bat assembly, in a process known as "Resin Transfer Molding". The resin is then cured. After curing, mold 72 is removed. (See col. 12 line 63 through col. 14 line 42 of Hillerich).

In stark contrast, claim 1 recites "shrinking the die ... so as to compress the composite of fiber and resin in the tunnel." Kusy nor Hillerich alone or in combination, simply fail to disclose this limitation. Thus, no combination of Kusy or Hillerich discloses all of the limitations recited in claim 1, and simply cannot render claim 1 or dependent claims 2 to 14 obvious.

Further, the Applicant notes that Kusy and Hillerich are simply in non-analogous arts. Kusy is concerned with the manufacture of wire; Hillerich with the manufacture of baseball bats. As such, it would not have been obvious for a person skilled in art of Kusy to combine Kusy with Hillerich. Simply, a person skilled in the pultrusion fabrication of composite plastic or orthodontic wire would simply not be knowledgeable in the art of baseball bat manufacturing to modify the Kusy process.

Even if a person of ordinary skill would have had knowledge of both Kusy and Hillerich, Applicant further submits that neither Kusy, Hillerich or the Examiner provide any suggestion or motivation to combine the references. Although the Examiner suggests that process expedience such as mold removal provides the motivation for combining the two references, the Applicant respectfully submits that this suggestion is simply incorrect. The pultrusion process of Kusy is a continuous process, in that a continuous profile of the composite is pulled through the forming die 50, which is normally not removed after each section of the profile is cured. Rather, the forming die remains in position so that when the cured section is pulled out of the forming die, a next uncured section of the profile is pulled into the curing chamber. Thus, using shrinkable dies in the pultrusion process of Kusy would require that the die be repeatedly replaced after each curing. Removal of the forming die after curing of each section would substantially slow down and complicate the operation, not expedite it as suggested by the Examiner. Thus, Kusy, in fact, teaches away from such a combination.

Additionally, as disclosed in the specification, the prior known processes for forming a fiber reinforced composite result in composites having an uneven fiber distribution, particularly when the fiber content is in a certain percentage range (see e.g. paragraph [0007]). Kusy recognizes this problem but does not provide any solution (see. e.g. col. 14, ll. 49 to 55 of Kusy). Advantageously the claimed process allows formation of composite having a substantially uniform fiber distribution even when the fiber content is low, resulting from shrinking the die and curing the composite. Again, shrinking the die and curing and the associated advantageous are simply not disclosed or suggested by Kusy or Hillerich.

Finally, the known process disclosed in Kusy results in composite wires, as shown in Figs. 6a to 6f of Kusy, having irregular cross-sectional shapes. In Kusy, even though the forming die 50 has a generally circular bore 51A (see Figs. 2 and 3, and col. 12, ll. 12-19 of Kusy), the cross-sections of the wires formed are not substantially circular. Advantageously, the resulting composite formed in accordance with claims 1-17, may have a cross-sectional shape that closely conforms to the transversal cross-section of the tunnel of the die. For example, as disclosed in the present specification, when the tunnel of the die has a circular cross-section (see paragraph [0028]) and the die is shrank to compress the composite, the resulting composite has a substantially circular cross-sectional shape, as can be seen from Fig. 5. Again, this benefit is simply not recognized, disclosed, or suggested by Kusy or Hillerich.

For all of the above reasons, withdrawal of the rejection of claims 1 to 14 under 35 USC 103 is respectfully requested, as a *prima facie* case of obviousness has not been established.

The Examiner has further rejected former claims 15 and 16 under 35 U.S.C. §102(b) as being anticipated by Kusy. Amended claims 15 and 16 each recite a composite having a substantially circular cross-sectional shape and comprising substantially evenly distributed fiber strands. In contrast, the cross-sections of the wires disclosed in Kusy are not substantially circular (see FIGS. 6a to 6f of Kusy). Further, the fiber distribution in the wires disclosed in Kusy is uneven when the fiber content is low (see FIGS. 6a to 6c, and col. 14, ll. 49 to 55 of Kusy). It is therefore submitted that Kusy does not disclose all of the limitations of each of amended claims 15 and 16. Thus, withdrawal of this rejection is respectfully requested.

In view of the foregoing, favourable reconsideration and allowance of claims 1-16 is requested.

New claims 17-20 are presented for consideration by the Examiner. It is believed that these claims, too, are in condition for allowance.

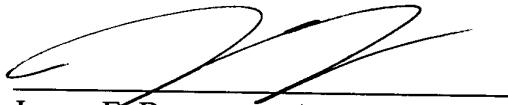
No new matter has been added by this amendment.

In view of the foregoing, reconsideration and allowance of this application is earnestly solicited.

Respectfully submitted,

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